CHAPTER ONE
THE KING'S FUND BED PROJECT

Origins

In 1967, a Report entitled *The Design of Hospital Bedsteads* was published by the King's Fund in London.[1] The Report, which contained a specification for 'a bedstead suitable for general purposes', was the result of a four year project which had cost in the region of £35,000.[2] Many accounts of the origins of the project, especially those provided by participants, begin with a situation described in January 1964 by the then Minister of Health, Anthony Barber, in a speech to the Doncaster Branch of the Royal College of Nursing.[3] Barber pronounced himself horrified to find that manufacturers offered 'more than three hundred different patterns of hospital bed.'[4] Later in the speech he went on to extol, cautiously, the virtues of a degree of equipment standardisation within the NHS.

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[1] King Edward's Hospital Fund for London, *Design of Hospital Bedsteads*, 1967.

[2] Figure compiled from 'Notes of a meeting at the Hospital Centre', Roberts, Hall and Archer, AAD/1989/9, Job 13.

[3] For accounts of the project by participants, see Bruce Archer, 'Designing a hospital bed', *SIA Journal*, 152/153, October/November 1965, pp.1-7., Gillian Patterson, 'Hospital Design: equipment and buildings', *Official Architecture and Planning*, July 1968, pp. 905-908. For other accounts, see James Cousins, 'A general purpose bedstead for hospitals', *Design*, 195, March 1965, pp.53-59., David Crawford, 'What happened to the hospital bedstead?', *Journal of the Society of Industrial Artists and Designers*, January 1968, 179, pp.4-5, Irfon Roberts, 'Design of Hospital Bedsteads', *Hospital Management, Planning and Equipment*, May 1967, p. 244.

[4] Transcript, speech by Anthony Barber, 17.1.64, AAD/1989/9, Job 7.

Although, as noted above, the 1960's was a decade of relative buoyancy, with the £500 million Hospital Plan not only under way but to be officially speeded up in 1965, attention to cost saving had increased steadily from the outset of the Service.[5] The Public Accounts Committee for 1961-2 had turned its attention to the NHS, pointing out wide discrepancies in the prices paid by different hospitals for similar goods: for example, sums ranging from £16 to £50 had been paid for hospital beds, and from £8 to £34 for bedside lockers.[6] The Committee returned to the subject the following year, noting that 'arrangements are now being made to secure greater economy in the purchase of equipment by hospital authorities . . . however . . . much remains to be done before these arrangements will be fully effective; and in the meantime considerable sums are being spent.' They regretted the delay in the preparation of standard specifications and urged their introduction at 'the earliest possible date'.[7] Large orders for hospital equipment of the same design would save money, especially in the fit-out of ninety projected new hospitals in the Ten Year Plan, which it was estimated would cost between £60 and £85 million. Barber assured his audience that he had just set up 22 study groups, comprising architects, engineers and quantity surveyors, working on designs for hospital components to allow for bulk production.[8]

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[5]Webster points out that after the 1956 Guillebaud Committee (who commissioned an economic analysis by Brian Abel-Smith and R.M. Titmuss) refuted claims of excessive costs, 'no subsequent administration has dared to set up an independent enquiry into the cost of health care in the UK', Webster, *The National Health Service*, p.33. This did not of course prevent scrutiny by the Public Accounts Committee.

[6]Civil Appropriation Accounts (Classes I-V) 1961-2, HMSO.

[7]Civil Appropriation Accounts (Classes I-V) 1962-3, HMSO.

[8]op. cit. note 4.

The choice of this episode in 1964 to open the narrative is in line with a portrayal of the King's Fund Bed Project as a rational exercise in variety reduction to permit the economies of large orders and large production runs. In fact the MOH had been involved with the question of hospital beds since at least 1962. And although it had been their policy since 1949 to encourage joint and central contracting for NHS hospital supplies because of the potential financial savings brought by bulk ordering, this was not, in 1962, their only concern.[9] A visit to the Royal Hampshire Hospital that year had prompted the then Minister of Health, Enoch Powell, to direct attention to what was dubbed 'the mechanization of the nurse's task'. 'I should like to feel sure', Powell wrote to his Private Secretary, 'that before we advance far on the hospital building programme, the attempt has been made to envisage as boldly as possible the mechanisation of nursing and patient care generally which may be possible in the next decade or two'.[10] Powell's immediate concern was not cost saving, but labour shortage. The protracted and serious shortage of nurses in the NHS, identified since the outset of the Service, showed no immediate signs of improving. This was despite numerous initiatives during the 1950's on issues of recruitment, training, pay and the high 'wastage' rate of student nurses. In Parliament, Powell asserted there were more nurses than ever before, which was true, but hardly the point.[11] In private

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[9] Supplies Division memo, 13.7.49 : 'HMCs and BGs are encouraged to consider the advantages of joint contracting not only for food and common services eg laundry which can be covered centrally by the Ministry, but also for equipment and stores which are not for the present under central supply through the Ministry.', MH 136/17.

[10] Powell to Brandes, 5.10.62, MH.136/12.

[11] Rivett, *From Cradle to Grave*, p.189. See also Webster, *The Health Services since the War*, pp.170-177.

he was deeply concerned and insisted that the Ministry consider other ways of alleviating the situation. 'Should we not ask,' he continued to his Private Secretary,' . . . what mechanical and powered assistance would be necessary if the same quantity of care and attention had to be given with half the present quantity of woman-hours?'[12] Powell called a meeting which included the Chief Nursing Officer, a Principal Medical Officer, the Controller of Supplies and the Chief Architect at the Ministry 'to discuss ways of conserving nursing time' in July 1962. At this he decided that five reviews should be initiated. They were: 'methods of disposing of waste products of the human body, methods of handling the immobile patient (to include the bed), feeding procedures, ward supply and replenishment systems and the documentation of patients.'.[13]

According to the Controller of Supplies, the Minister 'made it plain that he thought it was quite possible to apply to the hospital modern technological advances which had transformed industry in the last ten years'. He felt that 'without any loss of human touch it was possible and sensible to regard the seriously ill patient as a 150lb. job passing through a planned series of modern processes.' When it was pointed out that some of the proposed ways of saving nurses' time, such as the use of disposables, were unlikely to save money, the Minister told the meeting that this should not be of undue influence in considering the introduction of new methods. 'The most precious commodity to be saved was manpower and particularly nursing manpower.'

As a result of this meeting it was clear to the Controller of Supplies

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[12]op. cit. note 10.

[13]Davies to Hollens, 13.10.62, MH136/12.

that 'among the various assignments we are likely to secure . . . will certainly be a study of hospital beds'. The head of the equipment section, F.R. Howes, was deputed to run this. It was suggested that:

> Faced with the bewildering range of beds now on the market a useful way of proceeding would be to ask the various experts in the office for their opinions on what functions a bed should discharge and the features which it should contain. It may be that we will find the need for, say three beds ranging from a simple apparatus for lying and sleeping on, to a fully motorised suspension equipment with a wide range of devices for diagnosis and therapy. The idea might then be to draw up user specifications for each of the types of bed and if we are not satisfied that an adequate bed is already commercially available, then to consider letting a development contract to a suitable firm - Vickers? I would be glad if you would commence thinking about this in advance of our receiving further direction.[14]

It was somewhat fortuitous for the Ministry, therefore, that the King's Fund was on the point of setting up a working party to look into the design of hospital beds.[15] In January 1963 the MOH asked the Fund to act on their behalf, thereby relieving themselves of at least one part of the huge task which Powell's review potentially involved. The King's Fund working party in question, however, was shortly to come under the influence of a researcher, Bruce Archer, whose interest in standardising hospital beds was not, primarily, saving the NHS money, alleviating the nursing crisis, or even increasing patient comfort, though all these factors would later be invoked in support of the concept of a 'bedstead suitable for the majority (say 60%) of patients being nursed in the ordinary wards of general hospitals'.[16]

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[14]Davies to Howes, 13.10.62, MH/136

[15]The Working Party on Hospital Beds first met on 19 February 1963. A/KE/PJ/17/19 KFWPHB Minutes, 19.2.63.

[16]Royal College of Art, Studies in the function and design of non-surgical hospital equipment, *Report No 12, General purpose hospital bedstead, user specification*, April 1964.

The origins of Archer's project predated any Ministerial initiative to the King's Fund, and indeed the setting up of the King's Fund Working Party on Hospital Beds. They lay in approaches to the other major charitable foundation then supporting British hospitals, the Nuffield Provincial Hospitals Trust. Founded in December 1939, the Trust provided funds for 'the creation, carrying on or extension . . . of hospital and ancillary medical services' throughout the Provinces.[17] Like the King's Fund, it received a steady stream of suggestions, applications for funding and requests for advice from hospital staff. In late 1960 however, the Trust had received an approach relating to hospital equipment design, including beds, from a less usual source. The Rector of one of London's foremost schools of art and design, the Royal College of Art in Kensington, was concerned to interest them in funding research in this area.[18]

The research was to be done in the School of Industrial Design (Engineering) created at the RCA two years earlier in 1959, under the professorship of the Armenian emigré, Misha Black.[19] By the 1960's, Black was a prominent figure in British cultural life. Since arriving in London in the 1930's his design projects had included the South Bank layout for the Festival of Britain in 1951 and work for the London Underground's new Victoria line.[20] Well placed to lobby wealthy foundations, Black, together with the RCA's Rector, Robin Darwin, succeeded in persuading the Nuffield

[17]For a history of the Trust, see Gordon McLachlan, *A History of the Nuffield Provincial Hospitals Trust*, *1940-1990*, London, Nuffield Provincial Hospitals Trust, 1992.

[18]Royal College of Art, *Studies in the function and design of non-surgical hospital equipment, Preliminary report,* 1 June 1962, Appendix A, p.1.

[19]Frayling, *The Royal College of Art*, pp.178-179.

[20]For a short account of Black's career up to 1965, see 'Designer's honour for Misha Black', *SIA Journal*, 152/153, October/November 1965, p.12. For his collected writings, see Avril Blake (ed), *The Black Papers on Design*, London, Pergamon, 1983.

Provincial Hospitals Trust to fund, initially for one year, a proposed four year project to investigate the design of 'non-surgical' hospital equipment.[21]

It was apparently envisaged that a publication complementing, and comparable to, the influential 'Studies in the Function and Design of Hospitals' by the architect Richard Llewelyn-Davies would result.[22] The NPHT had sponsored this volume, published in conjunction with Bristol University in 1955. It comprised a comprehensive study of the requirements for hospital accommodation, the physical environment, heating, lighting, ventilation, noise control and fire risks, together with detailed designs for individual departments. The ambitious, four year scheme which Black now proposed appeared to offer similarly comprehensive coverage of the fitting out of hospitals once building was complete. It was to result in:

1. A report describing how equipment schedules and specifications are prepared, how the selection of equipment is made, where equipment deficiencies are, and where future research and development would best be directed.

2. The classification and preliminary evaluation of types of equipment as part of the procedure for the selection of equipment for a new hospital.

3. Some equipment designs offered as better solutions to some of the more pressing needs.

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[21] The stress on 'non-surgical' equipment was intended to reassure medical staff that laymen were not about to become involved with diagnostic or therapeutic devices. Interview, Bruce Archer, 14.5.98.

[22] Royal College of Art, *Studies in the function and design of hospital equipment, Preliminary report*, 1 June 1962, p.2. Richard Llewelyn-Davies' investigation was published as *Studies in the Function and Design of Hospitals,* London, NPHT/Oxford University Press, 1955. Llewelyn-Davies was head of a Division of Architectural Studies at the Trust from 1954-1960. For an account of hospital building at this period see Jonathan Hughes, 'The "Matchbox on a Muffin": The Design of Hospitals in the Early NHS', *Medical History*, 44, no 1, pp.21-56.

These designs would culminate in recommended ranges of equipment and furniture, developed in conjunction with selected manufacturers, to be made available for purchase by hospitals.[23]

To run the project at the RCA, Black intended to appoint a research fellow, Bruce Archer.[24] Originally an engineer by training, Archer was coming to prominence in design circles because of his interest in design methodology and his early publications on the subject, largely in the magazine *Design.*[25] Archer was to become central to the issue of hospital bed design as carried out in the King's Fund Bed Project and his career prior to joining the RCA is therefore covered in some detail. It provides another alternative starting point for an account of the King's Fund Bed. For although Anthony Barber's remarks in 1964 or the criticisms of the Public Accounts Committee in 1963 have often been used to open narratives of the project, (including Archer's own), he was already heavily involved with hospital equipment prior to these dates. It was a field particularly suited to his interests and aspirations.

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[23]Royal College of Art, *Studies in the function and design of non-surgical hospital equipment, Preliminary report*, 1 June, 1962, p.2. The Hospital Equipment Group was the forerunner of the Industrial Design (Engineering) Research Unit at the RCA, which became the Department of Design Research in 1967. For an historical account, see Jean MacIntyre, *'The Department of Design Research at the RCA - Its Origins and its Legacy, 1956-1988,* unpublished MA dissertation, Victoria and Albert Museum and Royal College of Art, 1995.

[24]For a biographical note up to 1971, see L.Bruce Archer, *Technological innovation, a methodology*, London, Science Policy Foundation, 1971, (no pagination).

[25]A series by Archer entitled 'Design and Stress Analysis' appeared in *Design* as follows: 'Intuition versus mathematics', 90, June 1956, pp.12-19; 'Design Research', 91, July 1956, pp.31-34; 'Analytical Methods for product designing', 93, pp.29-33, September 1956; 'Photo-elasticity for the product designer', 96, December 1956, pp.42-46.

Bruce Archer[26]

Archer had been invalided out of wartime service in the Scots Guards. Aptitude tests applied by a resettlement board of the Ministry of Labour directed him into training as a mechanical engineer, and in engineering design. From 1945 he worked in production machine design, first in the cigarette industry, then with electronic products. An opening to teach production design on the new industrial design course at London's Central School of Art and Design led to increasing part time work there, which Archer supplemented by setting up his own consultancy in 1953. One early client was the eminent British designer Michael Farr, who employed him to manage projects. At the time, Farr was editor of the magazine *Design*, and Archer became a regular contributor.

As a mechanical engineer, Archer had no 'aesthetic' training. He was however of a mathematical and theoretical bent and had become increasingly interested in the process of design. Some of his earliest published papers, which appeared in *Design* in 1956 - 7, began to explore the relationship between aesthetics and function, and the role of mathematics and science in the design process.[27] His account of the prevailing attitude in mechanical engineering to 'user' factors, such as comfort or safety, and the whole area of what later became known as product design, is that they were regarded as 'rather fey'. He judged that the milieu of an art school would allow him to capitalize on the general loosening of interdisciplinary boundaries which characterised the

[26]This section relies on interviews, Bruce Archer, 14.5.98, 10.5.99, 9.5.00.

[27]op. cit. note 25.

immediate post-war years. It might be possible to involve graduates from disciplines such as psychology on his projects in a way which would not have been open to him in a department of engineering. For it seemed increasingly clear to him that the art of design was, if not actually a science, certainly amenable to scientific enquiry. He lamented the absence of 'examples of form which is genuinely the product of reliable calculation based on scientific principles'.[28]

Increasingly frustrated at 'not being heard' by the design establishment, Archer began to move in what he saw as the less reactionary circles of contemporary art, in particular those centred on London's Institute of Contemporary Art (ICA). The ICA had been a focus for the so-called Independent Group, an association of artists, architects and theoreticians who began to meet there during the 1950's.[29] The Group actively promoted a more interdisciplinary approach to art and design, being particularly concerned with (largely American) popular culture, and with science and technology. Leading members included Rayner Banham, Lawrence Alloway and Richard Hamilton, the originator of 'pop art'. Archer was introduced by Hamilton to the Argentine painter and intellectual, Tomas Maldonado, at that time co-Rector of the experimental German design school, the Hochschule für Gestaltung at Ulm.[30] Maldonado had

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[28]Archer, 'Intuition versus mathematics', p.12.

[29]Anne Massey, 'The Independent Group as Design Theorists', in N. Hamilton (ed), *From Spitfire to Microchip: Studies in the History of Design from 1945*, London, Design Council, 1985, pp.54-58.

[30]The most extensive account of the school at Ulm is in Herbert Lindinger (ed), *Ulm Design: The Morality of Objects*, Berlin, Ernst and Sohn, 1990. Robin Kinross, 'Hochschule fur Gestaltung, Ulm: recent literature', in *Journal of Design History*, 1, 3-4, 1988, pp.251-256 is a review article which considers this and five other publications on the Hochschule. See also Heiner Jacob, 'HfG Ulm: A Personal View of an Experiment in Democracy and Design Education', *Journal of Design History*, 1, 3-4, 1988, pp.221-234.

been impressed by Archer's interest in design as process, writing appreciatively about his series of articles in *Design* .[31] Anxious to heal widening internal disagreements at Ulm as to the 'true nature of design', Maldonado invited Archer there for a year as a guest instructor in 1960.

The 'extraordinarily small, almost monastic college', known as the Hochschule für Gestaltung (HfG) at Ulm, in Swabia, has been widely identified as the successor to the Bauhaus. Like the Bauhaus, it came to have 'almost legendary status' for some designers, though its existence was short-lived and its precise legacy much debated.[32] Founded in memory of two students executed for political activities by the Nazis in 1944, the HfG was a privately supported postgraduate school of design run on lines unprecedented in the German education system. With forty to fifty percent foreign students and a huge preponderance of guest instructors over faculty staff, it was intended to be an international centre for teaching, development and research into the design of industrial products. Explicitly anti-fascistic, the school was to participate in the making of a new culture, from spoon to city. A large donation from the US government enabled the HfG to open formally in 1953.

However, this short-lived experiment (it lasted only fifteen years) was beset for much of its existence by disputes between different factions among the staff, ostensibly about the true nature of design and how it should be taught. Later, the growing student unrest of the late 1960's

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[31]Maldonado wrote to *Design* magazine in April 1958: 'In my opinion it is necessary to free design criticism from the numerous misconceptions of art criticism terminology and to turn design criticism into a new scientific design analysis. I appreciate especially in the magazine the contributions of Bruce Archer and Christopher Jones.' Quoted in MacIntyre, *The Department of Design Research*, p.15.

[32]This account relies on the sources in note 30.

further de-stabilised the Hochschule. Its funding, often precarious, received a fatal blow when the regional Baden Württemberg parliament withdrew financial support, the culmination of an ever worsening relationship between the conservative local community and the fiercely intellectual and reformist 'Ulmers'. 'In the rosy haze of the Adenauer years . . . and the kidney shaped coffee table, the inhabitants of Ulm considered the products of what they called the 'hochschule fur ungestaltung' to be a standing provocation - or at least a farrago of incomprehensible aberrations.'[33] The HfG was disbanded in 1968, the staff voting against a merger with Stuttgart University Architecture Department which offered state funding but loss of autonomy.[34]

When Archer arrived in 1960 the HfG was still vibrant, although factional disagreement among the staff was intense. He identified two main factions: the 'mathematician/scientists' and the 'designers'. Since each apparently considered that he had been brought in to support the other side, he was able to do little to diminish their differences of opinion. But the year of intense discussion with the mathematician/scientists, and observation of the designers at work in their ateliers at Ulm, gave him much food for thought. Reyner Banham, musing much later on what it was that took a 'devoted band of Britons', including himself, Archer and Richard Hamilton to Ulm in the late 1950's and early 1960's, concluded that it was:

> . . . a peculiar combination of interests that were mostly transient on the British side but more permanent at the Hochschule, more concerned with its basic orientations and its long-term patterns of intellectual growth. Both sides sought a way out of the local impasses into which design theory had fallen, but whereas the British impasse was one of almost total vacuity, the exhaustion of the 'gentlemen's

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[33]Lindinger (ed), *Ulm Design*, p.118.

[34]Jacob, *HfG Ulm: A Personal View*, p.234.

> agreements' of the 1930's and the lack of anything but the arts and crafts to fall back upon, the German situation seemed to us, as revealed by Tomas Maldonado, to be one of excessive rigidity, a cast iron system of categorical imperatives. But this was impressive to us visitors because of its relentless logic and intellectual clarity. I used to wonder why anybody bothered to speak to me at Ulm; I felt so stupid in my lack of dialectical method, and my head ached from having to find intellectual justifications for observations like 'Yes, I would like another bread roll'. Yet it was profoundly exciting to be in a milieu where issues about design could be discussed so intensively, especially if one had just come from London where there was at the time no intellectual discussion of design at all.[35]

For Archer, who had also been frustrated by the profoundly unintellectual state of the London design world, and whose aspirations towards a more 'scientific' approach to design had much in common with the theoretical position adopted by Maldonado at that time (this later changed), Ulm was an ideal environment in which to refine his ideas on design. Increasingly, he was preoccupied with the possibility of devising a new, systematic method of design. This led him into complex areas of mathematics which he discussed at Ulm with a mathematician and planning theorist, Horst Rittel.[36] Perhaps not surprisingly, Archer found he inclined more to the 'mathematicians' camp, (which also included theoreticians and scientists from other disciplines, such as applied psychology) rather than to that of the 'designers' such as Hans Gugelot and Otl Aicher. The latter asserted to him that their work was creative and expressive of fundamental truths, a view they substantiated with reference

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[35] Lindinger (ed), *Ulm Design*, pp.57-8.

[36] Rittel was subsequently at the Institute of Urban and Regional Development, University of California, Berkeley. His faculty seminars there were published as *The Universe of Design*, Berkeley, University of California, 1964. Archer discussed with Rittel the problem of modelling decisions which involved qualitative variables. Rittel advised him that a solution would be found in pure, rather than applied, mathematics, 'since non-quantitative relationships were at the heart of pure maths'. Interview, Bruce Archer, 10.5.99.

to Platonic philosophy and Gestalt theory. Their characteristic 'Ulm' style, often described as 'pure' or 'clean', became closely associated with Braun and several other companies who commissioned the School's designers around 1960. Particular features were the use of Platonic solids, the elimination of colour except for 'functional' purposes, and the adoption of the new sans-serif typefaces then being devised in Switzerland. Observation of the designers at work in their studios, however, led Archer to the view that they were in fact formulaic, rather than creative, using 'rules of thumb which gave a family likeness to different products.'[37] These Ulm designers had little sympathy for Archer's growing concern with elucidating what they saw as the essentially creative process of design. Others at Ulm were not so dismissive, however, and Archer's work there was influential. It formed the basis of the design method taught at the Hochschule after he left, and a student project there constituted the earliest trial of his new method.[38]

Archer left Ulm at the end of the academic year in 1961. Other commentators bear out his account of intense factional disputes. The period 1960-62 was identified as witnessing the height of a controversy over theoretical versus practical courses at Ulm, and 'the exact role that analytical methods should play in the design process'.[39] By the time the

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[37] As an example he cited the detailing of the rectangular Platonic solids favoured by the Ulm designers. They showed him that if both horizontal and vertical edges were given the same radius, where they met at the corners formed a hemisphere, looking 'as though a ball bearing was trapped beneath the casing'. They therefore routinely used a different radius on the vertical edges. Interview, Bruce Archer, 10.5.99.

[38] This was the design of a wristwatch by Reinhart Butter. Archer subsequently defended criticism of the design on the grounds that it had been developed 'on the basis of legibility experiments conducted under the supervision of an applied experimental psychologist'. Bruce Archer, letter, *The Architect's Journal*, September 21, 1966, p.728.

[39] Lindinger (ed), *Ulm Design*, p.143.

controversy abated somewhat, Archer was back in Britain and already working on hospital equipment. This was perhaps fortunate. The direction in which resolution occurred would not necessarily have been congenial to him. Maldonado's early views on the role of rationalism and science in design lost ground and the syllabus at Ulm was revised by the sculptor turned graphic designer, Otl Aicher. Topics such as 'operational research' were 'discreetly dropped', although the role of science in design continued to be hotly debated.[40]

Analytical or systematic design methods such as Archer was devising were initially received rather less critically in Britain and North America than in Continental Europe. And as another Ulm Faculty member, Gui Bonsieppe, later remarked:

> Anyone who works out rational criteria of decision making, and who prides himself on optimizing design solutions, is by that very fact presenting himself as a solid, serviceable sort of person, just what an industrial system requires.[41]

The comment, while certainly not directed at Archer personally, was apposite. After completing his year at Ulm, Archer needed a job, preferably in a field where he could perfect and try out his method. Before he left Ulm, Archer accepted Misha Black's offer of a research fellowship at the RCA to run the hospital equipment project. The socially relevant nature of the project suited the RCA, anxious at that time to rebut charges of ivory tower elitism.[42] It suited Misha Black, who was engaged in dragging his new Department into a closer involvement with industry.[43] And it very much

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[40]Lindinger (ed), *Ulm Design*, p.145.

[41]Lindinger (ed), *Ulm Design*, p.112.

[42]Frayling, *The Royal College of Art*, pp.178-9.

[43]Ibid.

suited Archer, for whom hospital equipment design appeared to have 'a near perfect combination of quantifiable and non-quantifiable variables.'[44]

Studies in the function and design of non-surgical hospital equipment[45]

Archer began work on the hospital equipment project in September 1961, bringing with him Reinhart Butter, one of his students from Ulm, as an assistant. So convinced was he that 'as soon as you have put something away in a filing cabinet you have embarked on a particular way of working', he resolved that he and Butter should have only a temporary office with temporary furniture, away from the future project team and indeed outside the College altogether, until they had drawn up the methods they would adopt.[46] The RCA, through an arrangement with the Science Museum, found them an office tucked away behind the Aeronautics Gallery of the latter institution. The products of their discussions were recorded, partly in English and partly in German, in a series of lengthy working documents.[47] In general these were couched in abstract terms and exhibited a preoccupation with methodology, with rigorous, often self-referential,

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[44]Interview, Bruce Archer, 14.5.98.

[45]This was the official title of the hospital equipment project.

[46]Interview, Bruce Archer, 6.8.98.

[47]This was because each used his first language in discussions, on the basis that it was harder to express complex ideas in a second language than it was to understand them. Curious observers of their intense lunchtime conversations in the Victoria and Albert Museum cafeteria often concluded that both were speaking Dutch. The documents are in AAD/1989/9, Job 1, Working Documents 5-14.

definition and with stepwise progression that was to characterise most of Archer's published work. For example, 'Task four' in the initial breakdown of work outlined by Archer and Butter was 'to prepare a system for locating and identifying all relevant information'. It had seven parts: part three was 'to set out a procedure for preparing an authoritative list of sources of information', part four was 'to prepare the authoritative list of sources of information', part five was 'to set out a procedure for preparing an authoritative list of existing information and current investigations' and part six was 'to prepare an authoritative list of existing information and current investigations.'[48]

Their concern with 'thorough and conscientious organisational preparation' was manifest, as was their insistence that the wide ranging investigation should only proceed '*stufenweis*' (in steps). While Working Document Two was an 'Overall programme of work for the investigation', Working Document Three was a 'Report on Task 1'. Working Document Four was a 'Report on Task 2, parts one and two', and Working Document Five was a 'Report on Task 2, part three'. This last contained a typical example of the way in which the style aspired to the abstract and mathematical even when considering the most mundane and practical affairs. The following analysis was provided as a justification for the list of office equipment required:

1. For the purpose of this report the key to the basic organisation for the investigation is figure 4 and para 3.31 in Working Document 4.

2. The establishment of staff for the first year's work is laid down in Working Document 3 para 3.13 as follows:

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[48]Task 1 for the investigation had been described as 'the codification of terms of reference for the investigation', Task 2 was 'the creation of a basic organisation for the investigation'. AAD/1989/9, Job 1, Working Document 2, Appendix B.

one full-time research leader
one full-time assistant
one part-time secretary.

3. An examination of possible systems and equipment offered by various potential suppliers is described in Working Document 1, para 3. 24.

4. The list of requirements is therefore obtained by equating the factors described in paras 2.1, 2.2 and 2,3 above.

The resultant list of requirements was tabulated against 'particulars of the equipment ultimately supplied'. Despite the elaborate statement of the method used to arrive at the list, a somewhat Spartan picture of the office equipment emerges. It comprised 'a typist's table, rack (stationary, light oak), broom, stamp (rubber), pad (ink), cups (white,four), together with eight books. In addition to *Webster's Dictionary*, *Roget's Thesaurus* and the *London A-Z*, these were the *Hospitals Year Book,* a copy of the *Hospital Plan for England and Wales* and the *Fifth Report of the Nuffield Provincial Hospitals Trust*, together with two nursing texts, *A General Textbook of Nursing* by Pearce and *Practical Notes on Nursing Procedures* by Britten.[49]

Archer's contact with the hospital milieu was not limited however to the perusal of these volumes. It was during the preliminary year of this project that he first came into contact with senior administrators on the Regional Hospital Boards, and with senior civil servants at the Ministry of Health, including the Undersecretary for Hospital Services, Raymond Gedling, and W. E. Tatton-Brown, who held the newly created position of

[49]AAD/1989/9, Job 1, Working Document 5. Evelyn Pearce, *A General Textbook of Nursing*, London, Faber and Faber Ltd., 1959., J.D. Britten, *Practical Notes on Nursing Procedures*, London, E. and S. Livingstone Ltd., 1960.

chief architect at the Ministry.[50] Apart from these meetings, Archer, with Butter and later a project team, spent the year's work almost exclusively concerned with information, its sourcing, organisation and processing. The management systems devised might well have been applied to any sphere of design, or indeed any field involving research and information handling.[51]

It was not until these systems were drawn up that other members of the team were appointed. Gillian Patterson, originally employed as Archer's secretary, was an arts graduate who rapidly became a key member of the 'core' research team. She was mathematically adept and took on special responsibility for information handling. Subsequently she ran entire projects when they inclined more to this field than to actual design and engineering, and became a Research Fellow in the Unit. Apart from a period spent obtaining an MA in the Department of Fine Arts at the RCA, Patterson worked for the Unit until she retired in 1988.

Kenneth Agnew, newly graduated from the Department of Engineering Design at the RCA but originally trained as an architect, was also to become a central figure in the Unit, leading many subsequent projects in both the medical and non-medical fields. He left the RCA in 1978, having been deputy head of the Department of Design Research, to become Professor of Design,University of Ulster.

A nurse, Doreen Norton, was the fourth member of the core team. Norton was unusual among her contemporaries in that she had a sustained

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[50]Creation of a Chief Architect's post at the Ministry of Health had been another attempt at cost reduction. See Webster, *The Health Services since the War*, p.39.

[51]It was in fact described as the 'Design of a research management system' in a list of jobs undertaken by the Department of Design Research compiled much later by Archer. Bruce Archer, 'List of Active Jobs', personal communication, 1998.

interest in nursing research and had published in the field. She was a co-author with the geriatrician, A. N. Exton-Smith, of *An Investigation of Geriatric Nursing Problems in Hospital.*[52] It was probably the Royal College of Nursing that recommended her for the project.[53] Apart from nursing officers from the Ministry of Health who were involved on a very intermittent basis, and the 'nurse juries' arranged at the beginning of the project (see Chapter Three), Norton was the principal source of information on nursing and ward practice generally. She left to take up a research position with the National Corporation for the Care of Old People in 1963, but had considerable input into the King's Fund Bed Project at decisive early stages. She was the spokesperson on 'user needs', and the concept of 'user needs' was central to Archer's method of design.

The result of the team's first year's work, however, from September 1961 to September 1962, was not, it seems, what the sponsors expected. Instead of concrete suggestions or designs for hospital equipment, the NPHT were presented with a highly abstract and theoretical 43 page report entitled *'Studies in the function and design of non-surgical hospital equipment'.* In the words of the Report, as the end product of the year's work, it consisted virtually entirely of information garnered from outside sources, the investigation having been organised 'as an information seeking and evaluating body'. In the design method which Archer was devising, a precise formulation of the design problem was essential, and this was what, in his view, the Report represented. A subsequent three

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[52]Doreen Norton, Rhoda McLaren and A.N. Exton-Smith, *An Investigation of Geriatric Nursing Problems in Hospital*, Edinburgh, Churchill Livingstone, 1962 (1975 reprint).

[53]Interview, Doreen Norton, 22.4.99. An account of Norton's work appeared in the *Daily Telegraph*, 'The shy reformer working to brighten our hospitals', February 22, 1968.

year programme for solving the problem of designing and specifying 'non-surgical' hospital equipment was proposed. It involved the formation of three groups: a pilot study sub-unit would

> become responsible for specifying and selecting fixed and movable equipment of the class defined, for a projected hospital development. This group will strive to satisfy all the commissioning authority's needs and in doing so will it will indicate to the workers in the other subunits what the problems are in the implementation of a specific project and where the gaps in knowledge lie.

An 'inductive studies' sub-unit would 'provide analyzed catalogue information for the pilot study group'. The pilot study group would 'raise questions for a third sub-unit, the 'peripheral studies group', who would 'provide tabulated information for the pilot studies group, and so on'. Archer, with Misha Black, had already had a meeting at the Ministry of Health in April 1962, as a result of an approach to the Chief Architect to request that they suggest a suitable hospital for the pilot study. The new West Middlesex, a district general hospital being built at Isleworth, just west of London, was nominated.

The Nuffield Provincial Hospitals Trust, however, declined to continue with funding. Although Archer considered that the Nuffield governors, dominated as they were by eminent medical men, had resented any suggestion that lay professionals might be better at specifying hospital equipment, it seems likely that the highly abstract and theoretical nature of the document with which they were presented had come as a surprise. Large sections of the Report were devoted to laying down precise definitions, terms of reference and objectives. Llewelyn-Davies' book, by contrast, was an accessible and practical handbook widely used by architects involved in hospital building. With only £600 of the grant remaining, Archer decided to disband the team and use the money to allow

Agnew to develop at least one tangible example of how their methods could result in useful equipment. The chosen item was a lockable ward medicine trolley, which was duly produced and trialled.[54] Although ultimately quite successful, this was not enough, it seems, to persuade the NPHT to renew their grant. The projected next phase of what was to have been a four year project was now in abeyance unless another sponsor could be found.

In August 1962 Misha Black approached the King's Fund in the hope that they would take over financing the project.[55] A key player in the pre-NHS medical metropolis, the Fund had lost its original purpose with the coming of the Health Service. No longer involved primarily with financially supporting the running of London's prestigious voluntary hospitals, officials of the Fund had been re-defining its role since 1948.[56] They turned to such areas as hospital catering, equipment and, in particular, the training of hospital administrators and other non-medical staff. They also continued to run the Emergency Bed Service and the Nursing Recruitment Service on behalf of the MOH. In some ways the Fund was a more likely sponsor for the RCA project than the Nuffield Trust. Less dominated by the medical elite, less involved with sponsoring medical research, and with strong allegiances to the traditional concerns of lay hospital management for patient welfare, they had already made it their business to advise on hospital equipment, and had plans to open a centre where hospital staff

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[54]The method of design of the medicine trolley was described in Royal College of Art, *Studies in the function and design of non-surgical hospital equipment, Supplement to preliminary report*, November, 1962.

[55]Misha Black to Hall, 2.8.62, A/KE/PJ/17/1.

[56]'Future of the King's Fund', *British Hospital Journal and Social Service Review,* August 23, 1968., p.1537.

could familiarise themselves with what was available.[57] And as noted above, receipt of a number of enquiries regarding hospital beds had already led the Fund to consider setting up a working party on this subject before Black approached them about the hospital equipment project.[58]

The King's Fund Working Party on Hospital Beds, which first met in February 1963, was of a traditional composition for the Fund.[59] In the chair was the Honourable Mrs R. M. T. Campbell-Preston, chairman of Westminster Press Provincial Newspapers and a member of the South West London Group Hospital Management Committee. The members comprised a matron from a London teaching hospital, a ward sister from a non-teaching hospital, a consultant in physical medicine, an engineer 'well known to the Fund' who was chairman of a large engineering firm, together with the former Secretary of a London Hospital Management Committee who was now the Regional Staff Officer of the North West Thames Metropolitan Hospital Region. Slightly less usually, a senior representative from the Ministry of Health was also included. This arose because the Working Party was deputed to carry out for the MOH that part of Enoch Powell's five-fold survey of hospital equipment which related to hospital

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[57]Known as the Hospital Centre, this opened in large (20,000 sq ft) central London premises in 1963, during the course of the bed project. It incorporated the Fund's Division of Hospital Facilities and the Hospital Catering Service and was intended to provide information on all aspects of hospital planning, organization and equipment. The centre included a lecture theatre and conference facilities. The entire first floor was made over to 'a changing display of hospital equipment'. 'The Hospital Centre's Unique Role', *British Hospital and Social Service Journal*, April 5, 1963, p.393.

[58]The Secretary of the Northern Group HMC, in possession of a legacy to re-equip a private patient's wing, suggested in September 1961 that the Fund provide a grant for the study of the use of different bed positions. It was known that the Royal Marsden Hospital had just installed some electrically powered beds at a cost of £200 each. The Fund, although sympathetic to the idea, refused a grant on the basis that 'the Nuffield Trust was 'initiating similar work'. A/KE/PJ/17/1.

[59]King Edward's Hospital Fund for London*, Design of Hospital Bedsteads*, p. 4.

bedsteads. The initial attendance of the Undersecretary, Gedling, was perhaps an indication that, notwithstanding Powell's concern with saving nursing time, the Ministry had never lost sight of the potential economic benefits of standardising hospital equipment.

Standardisation of equipment had been discussed at high level at the MOH since at least 1958. Although the Ministry had accepted the Messer Committee's conclusions that year that joint (rather than central) contracting 'provided the only practical method of combining the advantages of large scale buying with the existing autonomy of hospital groups', Powell's concern with 'the mechanization of the nurses task' had again brought the matter to prominence.[60] So, too, had unrelated events in the 1950's concerning other kinds of medical equipment. Between 1947 and 1954 there had been thirty six explosions in operating theatres in the UK, apparently caused by sparks igniting anaesthetic gases, and prompting the MOH to convene a working party which produced recommendations in 1956.[61] But the increasingly rapid and largely uncontrolled introduction of electromedical equipment into hospitals continued, and was viewed as a potentially serious risk to patients and staff. The Ministry had employed a single Electrical Safety Officer since 1950.[62] In theory this individual was responsible for the safety of all electrical devices (apart from x-ray equipment) in all NHS hospitals; an

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[60]Report of the Messer Committee on Hospital Supplies, quoted in 'Hospital Supplies and the Hunt Report', *British Hospital and Social Service Review*, December 9, 1966, pp. 2361-2367 and 2361.

[61]*Report of a Working Party on Anaesthetic Explosions including Safety Code for Equipment and Installations*, HMSO, 1956.

[62]Interview, Kenneth Dobbie, 6.6.00, see also 'Hospital Engineers and Safety Officers', *British Hospital and Social Service Journal*, March 3, 1966.

impossibly large task that was further compounded by the relative lack of electrical engineering skills then available on site. In the pre-war years hospitals had frequently employed marine engineers. Their prospects in shipping were dwindling and their expertise with steam was relevant to the major equipment then present in the hospital milieu: that for heating and autoclaving. By the mid 1960's, the superintending engineer at the MOH was led to conclude that:

> the present image of the hospital engineer is too closely allied to the boiler house . . . in the past the boiler house was very important but you don't need to look into a crystal ball to see that the steam boiler will disappear from the hospital just as the steam engine has disappeared from the railways . . . '[63]

He urged hospital engineers to take more interest in electrical, and particularly electronic, equipment.[64] A few of the most prestigious hospitals employed chartered engineers, but these were largely mechanical. Electrical engineering skills were not widespread in the Service, and the issue of electrical safety was unlikely to recede. Standardisation of equipment offered one way of reducing potential hazard.

There were, therefore, not only financial reasons why equipment standardisation was of considerable interest to the MOH in the early 1960's. But undoubtedly economics was to be the most enduring concern. Powell's time at the Ministry came to an end in October 1963.

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[63] 'The outlook in hospital engineering', *British Hospital Journal and Social Service Review*, June 25, 1965, p.1198.

[64] The initial reluctance in several branches of engineering to adopt electronic devices had considerable implications for medical equipment design in the 1960's. For an example see G.M.Lawrence, 'Design Solutions for Medical Technology: Charles Drew's Profound Hypothermia Apparatus for Cardiac Surgery' in R.Bud, B.Finn and H.Trischler (eds), *Manifesting Medicine: Bodies and Machines*, Amsterdam, Harwood Academic Publishers, 1999, pp.63-77.

'Mechanization of the nurses task' was not pursued to any extent as a solution to the nursing shortage. Electrical safety was tackled by the issuing of technical memoranda by the Ministry of Health. But 'supplies' (including consumables) continued to account for very substantial expenditure. In 1963 around twenty percent of hospital expenditure came under this head.[65] This figure represented an increase of between 25 and 30 per cent on the previous year's. 'I am heartily sick, wrote the Deputy Secretary,' when visiting hospitals, of being shown new beds, or lockers, "built specially to our design", no doubt at considerable extra cost.'[66]

The Hospital Services Division, instructed to look into the matter of standardising equipment in 1958, had produced a discussion document for the Regional Hospital Board Secretaries. Its author, Gedling, took the opportunity of getting the files out again, 'since the work linked up with the Minister's discussion on the mechanization of nursing'. As a start, he wrote, 'I should like to see proposals for producing standard specifications for one or two common items of non-technical equipment, and I think that beds and bedside lockers are as good examples as any.'[67]

Undersecretary Gedling's place on the working party was later deputed to the less senior but more useful Controller of Supplies at the

MOH, J. F. Hunt, who was to become a significant player in the King's Fund Bed project.[68] By 1962, the Public Accounts Committee was

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[65]Office of Health Economics, *Hospital Costs in Perspective,* 1963, p.5.

[66]'Deputy Secretary to Secretary', 17.8.62, MH136/11.

[67]'Deputy Secretary to Secretary', 14.8.62, MH136/11.

[68]J.F. Hunt, Assistant Secretary, MOH Supplies Division replaced Gedling on 23.10.63., A/KE/PJ/17/1.

breathing down the necks of the MOH and their Report for the year 1962-3 made plain that they regretted the delay in the preparation of standard specifications, since they had raised the matter the previous year.[69] They urged 'their introduction at the earliest possible date'. They were confident that 'future Committees would follow with interest the progress made in drawing up the specifications'.[70] Hunt was deputed to chair a committee of enquiry into hospital supplies in 1962. In the Hunt Committee's Report, published in 1966, the organization of supplies on an area rather than a hospital group basis would be advocated, as would increasing standardisation, as essential, if sensitive, courses of action.[71] The King's Fund Bed was potentially a prominent example of what might be achieved. Furthermore, the project was the only one of its kind thought likely to come to fruition in time to appease the Public Accounts Committee. The working groups set up by Barber in response to the Public Accounts Committee's findings were not expected to report before the end of 1964 at the earliest. But centralisation remained a sensitive issue in the NHS. In an internal MOH paper Gedling warned 'We are here contemplating a serious reduction in the power of HMCs and Boards of Governors and must expect opposition'.[72] Promotion of standardisation was considered more likely to succeed if it came from the 'neutral' voice of the King's Fund, rather than the Ministry. Some old-style hospital governors disliked central control as much as their medical colleagues, and the more flamboyant took special

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[69]Civil Appropriation Accounts (Classes I-V)1961-2, HMSO.

[70]Civil Appropriation Accounts, (Classes I-V) 1962-3, HMSO.

[71]*Report of the Committee on Hospital Supplies Organisation*, (Hunt Committee), HMSO, 1966.

[72]'The specification and purchase of hospital equipment', 18.4.63, MH136/11

delight in flaunting Ministry directives.[73] The Ministry had a good relationship with the Fund, who were, in turn, respected by senior medical staff and hospital administrators. Perhaps because of lay dominance, the King's Fund traditionally managed to walk the tightrope between the MOH and hospital staffs.

The secretary to the Working Party was a relatively new official of the Fund, Irfon Roberts. Roberts had hoped to go into the Colonial Service when he was decommissioned after the war ended. Thwarted by ill health he had opted for hospital, instead of colonial, administration.[74] Taken on to the King's Fund Bursary scheme, to train in hospital administration, his first task for the Fund had been to run a two year investigation into the organization of portering work in hospitals, which he completed in a single year. During the time that the Working Party on Hospital Beds was in operation Roberts was made an Assistant Director of the Hospital Centre. It is clear that he was the engine driving the Working Party and did most of the work generated by it.

In the event, the Hospital Development Committee of the King's Fund did agree to sponsor completion of the RCA's hospital equipment study, from March 1963. From June, it was agreed that the RCA's studies

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[73]See for example the anecdote by 'Monitor' in the British Hospital Journal and Social Service Review, May 28, 1965, p. 963. On his first day of a new job, the author had admired the new staff dining room. ' "Yes", said the House Governor, "it is rather pleasant and, funnily enough I received a letter from the Ministry today with approval to build it" '.

[74]Interview, Irfon Roberts, 27.7.98. There are strong links between the armed forces and hospital administration in the NHS at this period, certainly in the former voluntary hospitals and at the King's Fund. A former Royal Naval Officer, Jack Langworthy, ran the Emergency Bed Service at the King's Fund from 1951, turning down a job in MI5 to do so. The Secretary of the Fund at the time, Roger Phalps, had commanded a naval minesweeper and was known to favour an ex-Navy man for the job. In the selection of the Emergency Bed Service telephone operators, former Wrens (Womens Royal Naval Service) were given precedence. Taped interview, Jack Langworthy, no date, A/KE/Box 284, tapes 7-8.

would focus on the hospital bed, and that they would report to the Working Party on Hospital Bedsteads. This connection, fostered by informal discussions between Archer and Roberts in which the former outlined his ideas about rational design, and by difficulties and delays in the planned selection of equipment for the West Middlesex, brought about a conflation of interests which did much to ensure the existence of the artefact known as the King's Fund Bed.

In December, the Working Party visited the Royal College of Art. Misha Black presented a report 'explaining the scope and purpose of the inquiry into the design of hospital equipment sponsored by the King's Fund and associated with the West Middlesex Hospital. It was noted that since June, particular attention had been directed within the enquiry to the question of hospital bedstead design'. A presentation by Archer followed, outlining what had been done so far and what was proposed . . . the administration and clerical arrangements could not all be achieved from the team's own resources.'[75] From this point on, the project was integrated with the research of the Working Party. In the short term, it was agreed that the RCA team and the King's Fund Working Party would pursue their own separate lines of enquiry on bedsteads, pooling all information they obtained. To some extent this proved to be like trying to pool oil and water. The King's Fund Working Party was gradually compiling a list of characteristics which hospital bedsteads should possess. This they did largely by their traditional method of seeking informally the opinions of senior hospital staff with whom they had good working relationships. Their list of characteristics was produced in October 1963.[76] By that time,

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[75]A/KE/PJ/17/19, KFWPHB Minutes, 4.12.63, Item 11.

[76]'Notes on characteristics of a hospital bedstead suitable for the majority of patients',

however, the impetus for the project lay firmly with the RCA team, who were following at least the early stages of the complex systematic design method which Bruce Archer had been devising over the past five years or so.

23.10.63, revised 1.11.63. AAD/1989/9.